Five-Year Review Report

First Five-Year Review Report
for the
Oronogo-Duenweg Mining Belt Site

Jasper County, Missouri

September 2002

PREPARED BY:
the
U.S. Environmental Protection Agency
Region VII
Kansas City, Kansas

Approved:

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U. S. Environmental Protection Agency

Date:

9-27-02

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Five-Year Review Report

Table of Contents

List of Acronyms

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
CAG	Community Advisory Group
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COE	Corps of Engineers
DA	Designated Area
EE/CA	Engineering Evaluation/Cost Analysis
EMP	Environmental Master Plan
ICs	Institutional Controls
MDNR	Missouri Department of Natural Resources
MDOH	Missouri Department of Health
MHTD	Missouri Highway and Transportation Department
NCP	National Contingency Plan
O&M	Operation and Maintenance
OU	Operable Unit
ppm	Parts per million
PSWD	Public Water Supply District
PRP	Potentially Responsible Party
RI/FS	Remedial Investigation/Feasibility Study
RAO	Remedial Action Objectives
ROD	Record of Decision
SACM	Superfund Accelerated Cleanup Model
UAO	Unilateral Administrative Order
µg/dl	Microgram per deciliter

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Executive Summary

The remedial actions conducted to date at the Site have included removal and replacement of metals contaminated residential yard soil, construction of a repository for the residential soil, construction of public water supply systems, continuation of suppling bottled water until the public water supply systems are complete, and institutional control. The actions at Operable Units 2 and 3, Residential Yard Soils, have been completed. Actions at Operable Unit 4, Ground Water, constructions of the water lines, are nearing completion.

The assessment of this five-year review found that the remedies were constructed in accordance with the Record of Decisions. The remedies are functioning as designed. The immediate threats to people have been addressed and the remedies conducted to date are expected to be protective. Ecological risks has not yet been addressed.

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Five-Year Review Summary Form

SITE IDENTIFICATION

Site name *(from WasteLAN)*: Oronogo-Duenweg Mining Belt Site

EPA ID *(from WasteLAN)*: MOD 980686281

Region: VII	**State**: MO	**City/County:** Jasper County

SITE STATUS

NPL status: X Final **G** Deleted **G** Other (specify) _____

Remediation status (choose all that apply): X Under Construction **G** Operating **G** Complete

Multiple OUs?* X YES **G** NO	**Construction completion date:** Scheduled for 2008

Has site been put into reuse? X YES **G** NO Some areas

REVIEW STATUS

Lead agency: X EPA **G** State **G** Tribe **G** Other Federal Agency _____

Author name: D. Mark Doolan

Author title: Remedial Project Manager	**Author affiliation:** U.S. EPA

Review period:** Nov.1996 to Nov. 2001

Date(s) of site inspection: N/A

Type of review:

X Post-SARA **G** Pre-SARA **G** NPL-Removal only
G Non-NPL Remedial Action Site **G** NPL State/Tribe-lead
G Regional Discretion

Review number: X 1 (first) **G** 2 (second) **G** 3 (third) **G** Other (specify) _____

Triggering action:

G Actual RA Onsite Construction at OU #___ X Actual RA Start at OU#2&3
G Construction Completion **G** Previous Five-Year Review Report
G Other (specify) _____

Triggering action date *(from WasteLAN)*: November 15, 1996

Due date *(five years after triggering action date)*: November 15, 2001

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

The MDNR has expressed concern that funding may not be available to continue health education activities. Institutional controls have not been established to promote safe residential development in contaminated areas. Local governments may not adopt the controls once they are developed. EPA has not placed deed notices on properties where owners denied access for cleanup of residential soil. The fund to enable future cleanup of these properties at the buyers request has not been established.

Recommendations and Follow-up Actions:

The EPA will continue to work with MDNR to seek funding from the state legislature for the health education, or to develop an alternative way of funding the activities. EPA will work closely with the Citizens Task Force and their contractors to develop ordinances to promote safe residential development in contaminated areas. Once the proposed ordinances are developed, EPA will work closely with the local governments to stress the need for adopting and maintaining the controls. Deed notices will be placed on the properties in the near future where owners denied access for cleanup of residential soil. EPA is working with the local governments and the Citizens Task Force to determine the best vehicle for establishing a fund to enable future cleanup of properties that received the deed notices.

Protectiveness Statement(s):

The remedy at OUs 2 and 3 currently is considered protective of human health and the environment because all but a few residential yards, where access was denied, exceeding the soil action level for metals have been cleaned up. The followup exposure study conducted at the Site shows that EPA actually exceeded the goal for blood-lead reduction in small children. However, in order for the remedy to be protective in the long-term, institutional controls in the form of residential development ordinances must be adopted by the local governments to ensure safe development in contaminated areas. Additionally, placing deed notices on properties where owners denied access for cleanup will protect future buyers of those properties.

The remedy at OU 4, although not completed is currently protective of human health due to the provision of bottled water to homes with contaminated wells. However, bottled water is not considered a permanent remedy. The remedy is expected to be fully protective for the long term upon completion of the installation of the public water supplies.

A Site-wide remedy for OU 1 has not been selected. Therefore, OU 1, the mining wastes, still present a significant risk to the environment.

Oronogo-Duenweg Mining Belt Site
Jasper County, Missouri
Five-Year Review Report

I. Introduction

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and recommendations to address them.

The Agency has prepared this five-year review pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The United States Environmental Protection Agency (EPA) Region VII has conducted a five-year review of the remedial actions implemented at the Oronogo-Duenweg Mining Belt Site (Site) in Jasper County, Missouri. This review was conducted by the Remedial Project Manager for the Site for the period from November 1996 through November 2001. This report documents the results of the review.

This is the first five-year review for the Site. The triggering action for this review is the date of the start of remedial action for residential yard soils cleanup of operable unit (OU) 2 and 3. The five- year review is required due to the fact that hazardous substances, pollutants, or contaminants are or will be left on site above levels that allow for unlimited use and unrestricted exposure. The five-year review assesses each OU at the Site.

II. Site Chronology

Table 1: Chronology of Site Events

Event	Date
Initial discovery of problem or contamination	1986
Removal Assessment conducted	1989 - 1994
National Priority List final listing	1990
Administrative Order on Consent signed with Responsible Parties to conduct Remedial Investigation/Feasibility Study	1991
Remedial Investigation conducted (OU 1 & 4)	1991 - 1995
Health Assessment of child blood-lead	1991 - 1994
Human Health Risk Assessment	1991 - 1995
Ecological Risk Assessment	1991 - 1997
Unilateral Order to PRP to provide bottled water (OU 4)	1993
Time-critical Removal Action to provide bottled water (OU 4)	1993 - present
Time-critical Removal Action of Residential Yard Soil (OU 2& 3)	1995 - 1996
Record Of Decision for Residential Yard Soil (OU 2 & 3)	1996
Remedial Design for Residential Yard Soil (OU 2 & 3)	1996
Remedial Action of Residential Yard Soil (OU 2 & 3)	1996 - 2001
Record Of Decision for Ground Water (OU 4)	1998
Remedial Design for Ground Water (OU 4)	2000 - 2001
Remedial Action for Ground Water (OU 4)	2001 - present
Engineering Evaluation/Cost Analysis for use of mine waste in Highway construction	2000
Non-Time-Critical Removal Action, Highway construction using mine waste	2001 - present

III. Background

Historical Background

The Jasper County site represents the Missouri portion of the Tri-State Mining District. The Tri-State District encompasses approximately 2,500 square miles in Oklahoma, Kansas, and Missouri, and was formerly one of the richest lead and zinc ore deposits in the world. Mining and smelting activities began as early as 1830, peaked in the years from 1900 through 1950, and continued through the 1970s. The Missouri portion of the district lies within the southwest corner of Jasper County, Missouri. The Jasper County Site encompasses approximately 250 square miles of the district. Figure 1 shows the location and extent of the Site.

Ore production in Jasper County consisted of mining, milling, and smelting. Milling included crushing and grinding the rock to standard sizes and separating the ores. At one time, approximately 200 mines were found in and around the Oronogo and Duenweg areas. Extraction and milling of the ore created large piles of mining wastes distributed throughout the county. Approximately 100 million tons of mining and milling wastes contaminated with cadmium, lead, and zinc were created during the mining activities. Approximately 10 million tons of wastes remain on site scattered over 7,000 acres. These source piles have lead to the contamination of surface water, ground water, and surface soils. In addition, smelting operations dispersed air-born contaminants over a large area. Historic smelters have contaminated approximately 2,500 residential yards with unacceptable levels of lead.

Land and Resource Use

Approximately 60,000 people live within the Site boundaries. Most of the population is located with the city of Joplin and the surrounding communities of Webb City, Carterville, and Duenweg. Several other small communities are scattered throughout the Site. Land use within the site is mixed from rural, agricultural use, to urban. Growth in the communities is high. Development in many areas is spreading into mine scared lands. Prior to EPA's ground water actions, many homes outside corporate city limits relied of the shallow aquifer for drinking water through private water wells.

Site Enforcement History

The Jasper County site was proposed for listing on the National Priority List (NPL) on June 24, 1988, and was listed as Final on August 30, 1990. The EPA began negotiation with a group of potentially responsible parties (PRP) to perform a remedial investigation and feasibility study (RI/FS) on September 4, 1990, and entered into an Administrative Order on Consent (AOC) with the PRPs on August 6, 1991. Negotiations resulted in the site being divided into ten designated areas (DAs) for investigations. The PRP group agreed to perform the RI/FS at seven of the DAs while the EPA is performing the RI at the other three DAs. EPA subsequently added a fourth DA for investigation in the southern portion of the Site. The DA locations are shown on Figure 1. The PRPs have agreed to incorporate the information from the EPA's three DAs into one FS for the site.

The EPA has notified the following companies of potential responsibility for the Jasper

County Site: 1) ASARCO, Inc., 2) E.I. DuPont Company, 3) Gold Fields Mining Company, 4) Blue Tee Corporation (Beazer East, Inc.), 5) St. Joe Minerals Company (Doe Run Company), 6) Sun Company, 7) NL Industries, 8) Brown & Root, 9) USX, Inc., 10) AMAX, Inc., 11) Paramount Communications, 12) Eljer Manufacturing, 13) Connor Investment, 14) FSN, Inc., and 15) Eagle-Picher Industries, Inc.. The first nine companies listed are participating in the RI/FS. EPA has settled with Connor Investment and FSN Inc. through a *cash out*, and has settled a claim in bankruptcy court with Eagle-Picher Industries, Inc.

As part of the site wide RI, the PRPs sampled private water wells throughout the site. Approximately 100 wells were identified that exceed health based action levels for cadmium, lead, manganese, and/or zinc. The EPA issued a Unilateral Administrative Order (UAO) to the PRP to provide bottled water to these residents on December 16, 1993. On June 24, 1994, the EPA issued a second UAO to the PRP that expanded the number of homes to receive bottled water based on additional sampling conducted as part of the December 24, 1993, UAO.

On June 30, 1994, the EPA issued an AOC to the PRPs to sample all play areas of day care centers and to randomly sample residential yards throughout the site to prioritize removal and remedial actions. Sampling was conducted during the summer of 1994.

Basis for Site Actions

In 1991, the Missouri Department of Health (MDOH), funded by the Agency for Toxic Substances and Disease Registry (ATSDR), began a large-scaled health study to learn how local residents had been and were being affected by mine-related contamination. The results of that study, released in May 1994, "*found increased blood-lead levels due to exposure to contaminated soils in the Jasper County Superfund Site*" and recommended "*that exposure to the lead-contaminated soil in the study area be reduced.*" The study showed that approximately 14% of children less than seven years of age at the site had blood-lead levels exceeding 10 micrograms per deciliter (μg/dl).

In response to the health study, the EPA developed, in cooperation with other state, local, and federal agencies, a "Lead Strategy" for the Site which was presented to the public in May 1994 along with the findings of the health study. The strategy generally describes the cleanup action contemplated for the soils and mine wastes including a prioritization method to take care of those most at risk first. The strategy also describes the actions that the EPA took to provide bottled water to area residents whose wells were contaminated.

The priority of the lead strategy was to address the areas with the highest health risks first. These areas included day care centers with play area soil exceeding 500 parts per million (ppm) lead, yard soil exceeding 500 ppm lead at homes where children with elevated blood-lead reside, and residential yards soils exceeding 2500 ppm lead. The second priority was to remediate all residential yard soil exceeding 500 ppm lead at homes that had a trigger level sample exceeding 800 ppm. The final site priority was to replace the temporary bottled water program at homes with metals contaminated drinking water wells with a permanent safe water supply.

Beyond the human health issues in the area, a significant evaluation of the ecological impacts from mining was undertaken as a part of the remedial investigations. A detailed ecological risk assessment was performed. The U.S. Fish and Wildlife Service, under an

interagency agreement with EPA, has identified a federally listed endangered species and critical species habitat in the Site streams. The Ecological Risk Assessment, completion in May 1998, identified significant risk to both aquatic and terrestrial life.

Site Strategy

The overall strategy for the site is to follow a comprehensive response action approach to address both human health and ecological risk issues. The strategy incorporates the Superfund Accelerated Cleanup Model (SACM) approach where significant health risk problems are identified and remediated as quickly as possible. In order to manage the interrelated problems identified at the Jasper County Site, the EPA has divided the potential contamination problems into OUs. An OU is a clearly defined, smaller portion of the overall work to be completed at a Superfund subsite. Each operable unit is generally investigated and remediated on an individual basis. The criteria used to designate operable units are:

- Areas with similar contaminated media (soils, dust, ground water, etc.);
- Areas with similar geographic area;
- Areas that will be remediated using similar techniques;
- Areas that will be remediated within a similar time frame; and
- Areas that can be managed and addressed as an individual RI/FS.

These OUs are subject to change as more information becomes available. For example, it may be possible to further consolidate operable units if additional similarities between individual units are identified, or further investigation may show that some consolidated operable units must be broken down into smaller, more manageable units to carry out appropriate remedies.

Since there are many Superfund problems to be addressed, priorities are established to ensure the most serious problems are dealt with first. The EPA has identified high, medium, and low priority operable units according to the sequencing criteria listed below.

High Priority Sequencing Criteria:

1. High potential human health exposure.
2. High potential environmental exposure.
3. Provides critical-path data needed to fully address other operable units.

Medium Priority Sequencing Criteria:

1. Medium potential human health exposure.
2. Medium potential environmental exposure.
3. Potential for recontamination of other units located downstream, downgradient.
4. Unusually complex problem requiring lengthy evaluation.

Low Priority Sequencing Criteria:

1. Low potential human health exposure.
2. Low potential environmental exposure.
3. Low present human health or environmental exposure, but potential future exposure.
4. Low risk of offsite contamination.

The sequencing criteria are ranked according to several factors. Human exposures are generally given a higher ranking than other criteria. There is recognition that some human health concerns pose an immediate health risk that should be dealt with as a removal action. Other health concerns involve chronic risks over a lifetime of exposure that can be responded to with a later, longer-term action. In total, the sequencing criteria provide for the orderly resolution of human health and environmental concerns at the Superfund site.

The Jasper County site activities were initially conducted with a site-wide focus. Subsequent to these initial investigations, three operable units were identified based on the mining and smelting-related activities. Each of the three operable units was evaluated against the above criteria shown in Section 3.1 and placed into a high or medium priority category. The results of this ranking is presented in Table 3.2. Based on the criteria, the Jasper County OUs have been prioritized in the following three groups: 1) Residential Yards; 2) Ground Water; and 3) Mine and Mill Waste. Subsequently, the Residential Yards operable unit was divided into the smelter zone area and mine waste area. This division was done solely to track response costs associated with each area for the purposes for recovering costs from the PRPs.

The following describe the OUs established for the Site:

OU 1: This operable unit was set up to address the overall problem of mine and mill waste. The investigations for this operable unit focused on the characterization of metal concentrations and areal distribution of mine wastes (overburden and development rock), mill wastes (chat, vegetated chat, and fine tailings), smelter-related materials (slag, clinker, and flux), transition zone soils near mined areas, and soils unaffected by mining. In addition, characterizations of water quality and loading sources were made for the Spring River and its major tributaries within the designated areas, the North Fork of the Spring River, Center Creek, Turkey Creek, and Short Creek. Sampling was also performed to characterize ground water levels and chemistry in the shallow and deep aquifers. Studies were conducted to identify users of both deep and shallow aquifer ground water and the current extent of the rural water districts which supply drinking water from the deep aquifer. Also included in this operable unit were investigations of the terrestrial ecology and aquatic biota. Ambient air quality for source-terms (chat and fine tailings) was assessed by operating air particulate samplers at two separate on-site locations. To quantify human exposure to metals in dust while

recreating on chat piles, personal air monitors were worn by individuals operating motorcycles and all-terrain vehicles. The human health related problems were split into the OUs listed below to expedite actions in those areas. Consequently, OU 1 will ultimately deal with the ecological risk issues. The ecological risk

assessment developed for the site will drive the final FS and subsequent Record of Decision (ROD).

OU 2: This operable unit was established to deal with the lead contamination found in residential yards in the smelter areas. The Residential Yard Assessment Report, prepared by Dames & Moore for the PRPs in November 1994, documents the results of the July and August 1994 initial survey of residential yards in selected areas of Jasper County, Missouri (and also in Cherokee, Kansas). The survey was designed to assess lead concentrations in yards soils, focusing on characterization of lead in yards in and near mill waste areas, and near historic sites of lead smelting. The survey indicated the area around the Eagle-Picher smelter in northwest Joplin as having the highest concentrations of soil lead and thus presented the greatest health risk. The EPA began a time-critical removal of residential soils and day care center soils in January 1995. The removal was completed in January 1996 and involved excavation and replacement of soil at six day care centers and 304 residential homes. The remedial program completed a ROD in August 1996 that addressed the remaining residences in the smelter area and mining areas with soil lead concentration above health based levels not remediated under the time-critical removal.

OU 3: The ROD has been signed for the residential yard, including those in the mining area, and the EPA is initiating this separate operable unit to deal with the homes built on or near mining wastes. This OU was established to tract remedial actions conducted in the mining areas. The remedial action performed for the residential yard OU (described above) were conducted by EPA, however, EPA is negotiating with the PRPs for payment of the response costs.

OU 4: This operable unit was established to deal with the contaminated shallow ground water and numerous contaminated private water supply wells. During the Phase I Remedial Investigation field program for this site, a number of households with shallow drinking water wells in the Oronogo-Duenweg (O/D) Designated Area (DA), the Iron Gate Extension DA, and the Neck/Alba DA were found to contain concentrations of lead, cadmium, zinc, and manganese in well water in excess of EPA action levels. Supplemental tap water sampling programs conducted in December 1993 and January 1994 confirmed these exceedances and identified additional households where shallow ground water containing metals concentrations in excess of the action levels was being consumed. The remedial actions include construction of a newly formed rural water district, and expansion of existing municipal water supply lines.

Community Involvement

The EPA awarded a Technical Assistance Grant to the Jasper County Superfund Site Coalition (Coalition). The Coalition has retained a group of professors at Kansas State University to serve as technical advisors. Members of the Coalition, besides the federal, state, and county agencies, include local citizens, business owners, and county commissioners. In general, the EPA provides documents generated from site activities such as the remedial investigation report, risk assessments, and feasibility study for review and comment. EPA, the Missouri Department of Natural Resources (MDNR), the Missouri Department of Health (MDOH), the ATSDR, and Jasper County Health Department representatives, meet with the Coalition periodically in a public forum to update the members on site activities and discuss site issues. The Coalition is focusing on problems associated with mining, milling and smelting wastes found throughout the Jasper County site.

Additionally, at the encouragement of EPA, a community advisory group (CAG) was formed by the Joplin City Council in 1995. The CAG membership consists of local citizens, bankers, realtors, business owners, county commissioners, county and city health department employees, local health care providers, state legislator representatives, city council members from several cities, the Joplin city manager and city attorney, school district representative, and a Joplin planning and zoning board member. The EPA, ATSDR, MDNR, and MDOH meet with the Task Force regularly to provide status updates, discuss site related issues, and solicit input and feedback on ongoing and proposed EPA actions. The focus of the Task Force has primarily been on the actions the EPA is conducting on residential yards surrounding a large primary lead smelter in northwest Joplin. In April 1998 the CAG reformed and expanded its membership to include representatives from Newton County, Missouri. The CAG has also received a grant for $200,000 from EPA to develop a two county wide environmental master plan (EMP). The EMP will establish recommended institutional controls for development of future residential areas in and around the mining and smelting areas, as well as address other non-Superfund related environmental problems in the counties.

Involvement of both the TAG and CAG has been extensive. EPA has shared and discussed with the groups results of removal sampling, remedial investigation, and risk assessments. To aid the public in understanding the risks from the site, the EPA and MDOH have lead discussions on the risk assessment process and how EPA develops risk numbers. Subsequently, EPA and MDOH presented the Site risk assessment to the groups. The EPA's work with these groups has resulted in a widespread community acceptance of the cleanup actions performed to date and proposed for the future to mitigate site risks.

IV. Remedial Actions

The following is a discussion of the response actions performed at the Site to date. The actions include time-critical, non-time-critical, and remedial actions.

OU 1, Mine and Mill Waste

Currently, EPA and the PRP are preparing the Feasibility Study report for OU 1 to address all mine and mill waste piles located throughout the Site. A ROD is scheduled for completion in March 2003. This ROD will address the ecological risk at the site resulting from release of metals contamination from the mine and mill waste piles.

In August 2002, EPA signed an EE/CA for a non-time-critical removal action of mining waste located in the Oronogo-Duenweg DA located on the east side of the Site, for cleanup of mining waste located in and adjacent to the construction corridor of the Route 249 highway project. The highway is being constructed by the Missouri Highway and Transportation Department (MHTD) through approximately four miles of the Site. The EE/CA specified using the mine and mill waste as subsurface fill during construction of the roadway as follows:

1. Excavation of the mining waste piles with transport into the highway corridor.
2. Removal of the top 12 inches of soil beneath the excavated waste piles.
3. Incorporation of the mining wastes and underlying soil into the highway construction fill.
4. Implementation of storm water runoff controls during excavation and disposal activities.
5. Dust suppression during excavation and disposal activities.
6. Placement of 12 inches of clean soil cover on all mining waste exceeding 1,500 ppm lead in the highway side slopes.
7 Revegetation of disturbed areas.

The design specifies the burial of approximately 600,000 cubic yards of mining waste under the roadway. EPA is funding MHTD to move the mining waste located outside of the corridor into the footprint of the roadway for disposal. To date MHTD has moved approximately 15,000 cubic yards of waste into the corridor and has incorporated the wastes into the construction fill.

OU 2, Smelter Zone Residential Yards Soil and OU 3, Mine Waste Residential Yard Soil

These OUs both address cleanup of residential yard soil. Response actions were identical and were conducted simultaneous for both OUs. Initial actions conducted for residential yards consisted of a time-critical removal initiated by EPA in late 1995 on 294 residential yards and six day care centers in the smelter area. Soil removal and replacement was completed at day care centers where soils were greater than 500 ppm lead and at residential yards where soils exceeded 2500 ppm lead or where a child in the home had a blood-lead level greater than 15 µg/dl. This time-critical removal was completed in May 1996. EPA signed a ROD for residential yard remediation in August 1996 and began cleanup of yard soil under the remedial program in November 1996. Only one remedial action objective (RAO) was stated in the ROD which was "Reduce public exposure, particularly Children's exposure, to residential soils with elevated lead and cadmium concentrations resulting from historic mining and smelting activities". The ROD

specified excavation and replacement of all residential yard soils exceeding 500 ppm lead at properties where at least one soil sample result exceeded 800 ppm. The major components of remedy were:

- Excavation and replacement of residential yard soils exceeding 500 ppm lead and 75 ppm cadmium.
- Construction of an on-site repository for excavated soil.
- Establishing institutional controls for new residential and day care center development.
- Continuation of the ongoing health education programs.
- Conducting a phosphate stabilization treatability study.
- Phosphate stabilization of yard soils if treatability study results are positive.

The EPA completed soil removal and replacement actions at 2,192 yards by September 2001. Except for approximately 30 owner-occupied homes where access for cleanup was denied by the owners, EPA replaced all smelter and mining related contaminated soil exceeding 500 ppm lead in the residential yards where the trigger level of 800 ppm lead was met. At homes where owners denied access for cleanup, EPA will be placing deed notices on the properties in the near future to notify potential buyers of the properties of the presences of lead contamination. Additionally, EPA will be establishing a fund to remediate these denied access properties in the future at the request of buyers, once the property is sold. All contaminated soil was placed in the repository on in the Route 249 corridor at 17th and Pine Street, southeast of Webb City.

The EPA and MDNR conducted a phosphate treatability study at the site over a period of approximately four years. Results of the study indicate that addition of phosphate amendments to lead contaminated soil can reduce the bioavailability of the lead by as much as 30 percent. EPA is currently discussing with MDNR the use of phosphate amendments on additional yards with lead contamination levels in the 500 ppm to 800 ppm level where a cleanup action was not triggered .

In addition to the soil replacement actions conducted by EPA, extensive health education activities have been carried out at the Site. Education activities continue to be conducted by many groups including the Joplin Health Department, Jasper County Health Department, Missouri Department of Health, ATSDR, Joplin and Jasper County school districts, and the local Girl Scout chapter. EPA has provided funding to ATSDR and the Missouri Department of Health, who in turn funnel the money to the local entities, to support many of the activities. These activities include the following:

- Extensive blood-lead screening and in-home assessments of children in the contaminated areas including door-to-door screening and distribution of educational material.
- Development and publication of a site-specific lead awareness and health education coloring book for distribution to pre-school children.
- Development of lead poisoning awareness curriculum in the local school district.

- Development of a Lead Poisoning Prevention merit badge for the local Girl Scouts chapter.
- Maintaining information booths at local heath fairs held in shopping malls, schools, and hospitals.
- Contacting local pediatricians to provide lead awareness and health educational information packets and encourage blood-lead screening.
- Conducting lead awareness and education seminars in conjunction with pre-natal classes at local hospitals.
- Mass mailing (22,000 copies) of a community news letter devoted to lead awareness, health education, and lead poisoning prevention.
- Providing lead educational materials to schools, daycare centers, and the Parents As Teacher Association.
- Offsite blood-lead screening activities at local community events.

The EPA is working with the local governments to establish the institutional controls (ICs) program for the residential portion of the site. The ICs will prevent improper development of lead contaminated land in the future. To date, the local community has developed an Environmental Master Plan for both Jasper and Newton Counties to address environmental problems and establish recommendations for the institutional controls for proper future residential development. The community has hired consultants to develop local ordinances for the controls. EPA anticipates these ordinances will be in place within the next one to two years.

OU 4, Ground Water

OU 4 was established to address ground water contamination in private residential water wells. During the investigations for OU 1, data was collected from private residential water wells indicating numerous wells exceeded health based standards for lead, cadmium, zinc, and manganese. EPA issued two UAOs to the PRPs in late 1993 and early 1994 to provide bottled water to homes with contaminated wells and to sample additional residential wells. EPA and the PRPs have been providing bottled water to those homes with contaminated wells since 1994. A feasibility study was completed in 1998 to assess permanent water supply options for the area of the site not covered by a public water supply system.

The EPA issued a ROD for remedial action for the private water supply wells in July 1998 which calls for installation of public water supply lines and point-of-use treatment units. The RAO developed for the OU 4 ROD was “Prevent unacceptable human health risk due to ingestion of or exposure to site-related contaminants in ground water”. Installation of the public water supply systems began in June 2001. EPA is funding Public Water Supply District 3 (PWSD3), the cities of Webb City and Duenweg, and Missouri American Water Company to install the new water supply systems to the areas of ground water contamination, which will cover approximately 25 square miles. During the design phase, EPA was able to expanded the extent of public water supply to include all but two of the homes which are specified in the ROD to receive a whole-house treatment unit. For these two homes, EPA is now planning to install new drinking water wells into the deep aquifer to eliminate the maintenance requirements of treatment units. To date, Duenweg and PWSD3 have nearly completed installation of their

respective system. Homes with contaminated wells in the area of the Site from Carterville to Duenweg should all be connected to a public water supply system by October 2002. Webb City still needs to install approximately one-half mile of water main and hook up two homes along their western city limits. EPA will be contracting with Missouri American Water Company in late 2002 to install several miles of water main and hook up homes in the Iron Gates Extension DA. Additionally, EPA is funding MDNR to install deep wells for two homes not economically feasible to connect to the public water supply systems.

Operation and Maintenance

To date, the only response actions that have been completed is the cleanup of the residential yard soils (OUs 2 and 3). Operation and maintenance (O&M) associated with this actions is limited to inspection and maintenance of the soil disposal repository. Other than one inspection of the repository by the EPA project manager, no costs have been incurred for O&M. The institutional controls associated with OUs 2 and 3 have not yet been implemented.

V. Five-Year Review Process

Administrative Components

The EPA actually began notification of the public and the responsible parties of the intention to conduct a five-year review in late 1999 when EPA signed a Interagency Agreement with ATSDR to conduct a followup exposure study at the site. The public was officially notified in August 2002 that EPA was finalizing the review. EPA placed adds in the local newspapers, notified the local media, and mailed fact sheets to citizens on the site mailing list. Both the newspaper adds and fact sheets invited comment from the public of the effectiveness of the remedy completed to date.

To assess the effectiveness of the remedy conducted for OUs 2 and 3, EPA entered into an Interagency Agreement with ATSDR to conduct a followup exposure study at the Site. The study was conducted by ATSDR, the MDOH, and the Jasper County Health Department from February 2000 through January 2002. Results of the Study were released to the public for review in February 2002.

Community Involvement

The EPA has discussed the five-year review process with the public through quarterly meetings with the Citizens Task Force since the initiation of the followup exposure study. During various meetings, discussions were held on the results of the exposure study and how they would be used in the review process. A series of public meeting and availability sessions were held on February 7 and 8, 2002, to discuss the result of the exposure study. The public was also informed, as mentioned above, of the completion of this five-year review through the media and mailed fact sheets in August 2002. No comments were received from the public on the five-

year review or the effectiveness of the remedies conducted to date.

Data Review

The remedial actions conducted to date were the cleanup of residential yard soil for OUs 2 and 3. To assess the effectiveness of this remedy, EPA requested ATSDR to conduct a followup exposure study of children under the age of 7 years. The initial exposure study, completed in 1994, indicated that 14 percent of children under the age of 7 had blood-lead concentrations greater than 10 µg/dl. Further, the study found that the most significant contributor to elevated blood-lead in children was lead contaminated yard soil. These results triggered the cleanup of residential yard soil (OUs 2 and 3) at the Site.

The Draft Final followup exposure study was released for public comment by the MDOH on January 23, 2002. The final version of the report, which addresses comments received during the public comment period has yet to be released. However, the Draft final version of the report indicates that when the blood-lead sampling was conducted in 1999, only 2 percent of children under the age of 7 had blood-lead concentrations exceeding 10 µg/dl, down from 14 percent in 1991. Additionally, the mean blood-lead in 1999 was 3.81 µg/dl, down from 6.24 µg/dl in 1991. This equates to a decrease in average blood-lead concentrations of approximately 4 percent per year and an overall decrease in children exceeding 10 µg/dl of 86 percent.

Site Inspection

In April 2002, EPA conducted an inspection of the residential yards where cleanup was completed during the last 12 months of the OUs 2 and 3 remedial action. EPA assumed that any problems associated with yards remediated prior to the last 12 months would have been reported to EPA or the cleanup contractor prior to de-mobilizing from the site. No problems, other than some general lack of lawn maintenance on the part of the home owner, were observed.

Also during April 2002, EPA, along with the Corps of Engineers (COE), inspected the soil repository where contaminated yard soils were placed during the remedial action. The repository was overgrown severely with weedy species. EPA and the COE burned the repository to help eliminate the weeds. Subsequent to the burning, warm season grasses were over-seeded on the entire repository.

VI. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

OUs 2 and 3

Currently, the remedial action completed for OUs 2 and 3 continues to be operational and functional and is performing as expected in the ROD. Cleanup levels were achieved in all but a few residential yards where owners denied access for cleanup. These yards will be addressed through institutional controls. The soil repository is functioning properly and only minimal operation and maintenance, in the form on burning weeds, has been required. EPA is performing the operation and maintenance until August 2003, at which time MDNR will take responsibility.

The establishment of part of the institutional controls defined in the ROD has yet to occur. The ROD specified development of controls for future residential development within the Site. The Citizens Task Force for the Site has assumed the task of developing local ordinances and development plans that could be adopted by the various governmental entities to ensure safe residential development in the Site. The Task Force has made good progress with the plans and should have the various ordinances ready for adoption by next year. Additionally, EPA will be placing deed notices on the properties where owners refused access for cleanup. The deed notices will protect future buyers of the properties by notifying them of the existing contamination. EPA will also be establishing a fund to pay for the future cleanup of these properties, at the request of the future purchaser. The deed notices and cleanup fund have not yet been completed.

The ROD specified ongoing health education as part of the remedy. Both the Jasper County and Joplin health departments have done an excellent job in conducting the health education. Among a variety of educational activities conducted, the agencies screen blood-lead of several thousand children per year, and do consultation with parents of those children that are elevated. EPA has funded the health education throughout the remedial action and into the first year of operation and maintenance. MDNR will become responsible to continue funding of the health education in August 2003.

Two potential issues may arise in the future to affect the long-term protectiveness of the remedy. First, some or even all of the local governments may fail to pass ordinances to control the residential development in contaminated areas. This would result in people building homes in areas with high lead contamination and exposing children to the lead. Secondly, MDNR has expressed concerns that they may not be able to obtain funding to continue the health education at the Site. This could potentially result in a decrease in the knowledge about lead and how to prevent exposure of the community, and a general rise in the average blood-lead level of local children. Additionally, the lack of blood-lead screening could result in continued and long-term exposure of children who have elevated blood-lead levels, but are not detected.

OU 1

Only minimal cleanup, in the Highway 249 corridor, has occurred in the mining waste. EPA is currently developing the feasibility study for the mining waste. A ROD is scheduled for 2003. Therefore, the mining waste continues to present a risk to the environment.

OU4

The remedy is currently operational and functional, and the remedial action, although not complete, is performing as expected in the ROD. Bottled water is still being supplied to homes with contaminated private drinking water wells until the individual home is connected to a public water supply. Construction of the water lines in the Oronogo-Duenweg DA is nearing completion. The water supply mains are being constructed by Public Water Supply District Number 3 and the city of Duenweg. Both entities should have all service lines complete and all homes currently receiving bottled water hooked into the system by fall 2002. Public water supply lines are still required in the Iron Gates Extension DA, and construction will begin at the completion of the systems in the Oronogo-Duenweg DA.

The MDNR has already established the institutional controls for OU 4, as specified in the ROD. Regulations were established to prohibit the installation of private drinking water supply wells in the contaminated zone of the shallow aquifer throughout both the Jasper and Newton County sites.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

There are no changes in the conditions of the Site that would affect the protectiveness of the remedies defined in either the OUs 2 and 3 or the OU 4 RODs. All toxicity information and risk assumptions used in the Risk Assessments and to set cleanup levels all are still current and appropriate.

With the exception of establishing the institutional controls regulating long-term residential development in contaminated areas, the RAO for OUs 2 and 3 have been met. All Applicable or Relevant and Appropriate Requirements (ARARs) identified in the RODs are still valid. The ARARs identified in the ROD for OUs 2 and 3 have been met with the exception of the To Be Considered State Chemical Specific ARAR which consists of a proposed rule recommending an any use soil level for lead of 240 ppm. This ARAR was not met since a site-specific cleanup level for lead was established in accordance with EPA policy and guidance.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

According to the reviews and inspections for the Site, the remedy for OUs 2 and 3 are functioning as intended buy the ROD. The remedy for OU 4, although construction is not yet complete, is expected to be fully functional in the near future. There have been no changes in the condition of the Site that would affect the protectiveness of the remedies selected to date. There

have been no changes to toxicity assumptions or risk assessment methodology that would alter cleanup levels that have been established for the Site. No other information has been found that would call into question the protectiveness of the remedies.

VII. Issues

The following table presents the issues identified with the current remedies that may affect the protectiveness of the remedial actions.

Table 2: Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
MDNR has expressed concern that funding may not be available to continue health education activities.	N	Y
Institutional controls have not been established to promote safe residential development in contaminated areas. Local governments may not adopt the controls once they are developed.	Y	Y
EPA has not placed deed notices on properties where owners denied access for cleanup of residential soil. The fund to enable future cleanup of these properties at the buyers request has not been established.	Y	Y

VIII. Recommendations and Follow-up Actions

The EPA will continue to work with MDNR to seek funding from the state legislature for the health education, or to develop an alternative way of funding the activities. EPA will work closely with the Citizens Task Force and their contractors to develop ordinances to promote safe residential development in contaminated areas. Once the proposed ordinances are developed, EPA will work closely with the local governments to stress the need for adopting and maintaining the controls. Deed notices will be placed on the properties in the near future where owners denied access for cleanup of residential soil. EPA is working with the local governments and the Citizens Task Force to determine the best vehicle for establishing a fund to enable future cleanup of properties that received the deed notices.

IX. Protectiveness Statement(s)

The remedy at OUs 2 and 3 currently is considered protective of human health and the environment because all but a few residential yards, where access was denied, exceeding the soil action level for metals have been cleaned up. The followup exposure study conducted at the Site shows that EPA actually exceeded the goal for blood-lead reduction in small children. However, in order for the remedy to be protective in the long-term, institutional controls in the form of residential development ordinances must be adopted by the local governments to ensure safe development in contaminated areas. Additionally, placing deed notices on properties where owners denied access for cleanup will protect future buyers of those properties.

The remedy at OU 4, although not completed is currently protective of human health due to the provision of bottled water to homes with contaminated wells. However, bottled water is not considered a permanent remedy. The remedy is expected to be fully protective for the long term upon completion of the installation of the public water supplies.

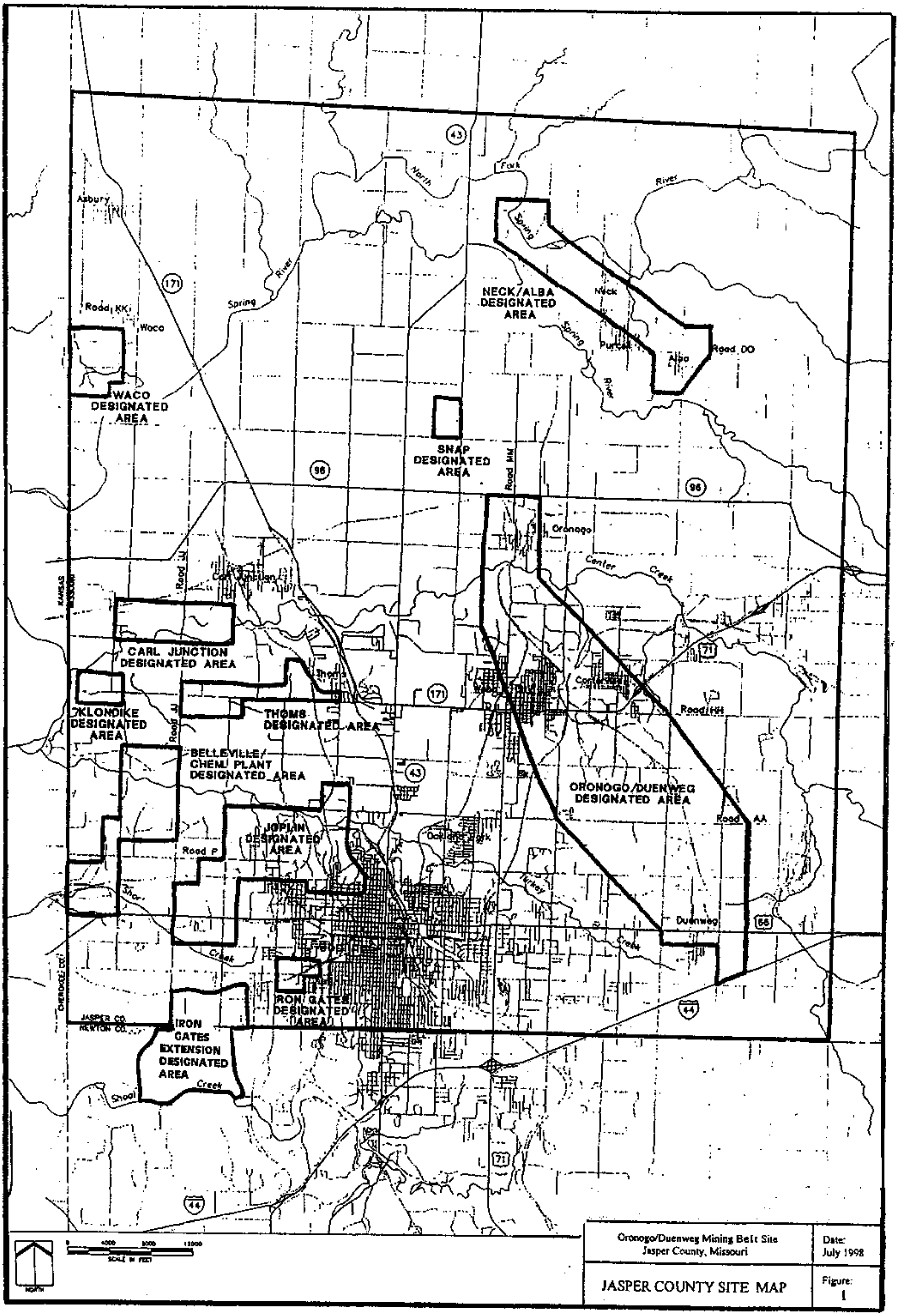
A Site-wide remedy for OU 1 has not been selected. Therefore, OU 1, the mining wastes, still present a significant risk to the environment. The risk assessment completed for the Site did not identify any significant risk to people resulting from exposure to mine waste except in a residential scenario.

X. Next Review

Due to the fact that hazardous substances remain on site, additional five-year reviews will be required. The next review is scheduled to be conducted in 2006.

ATTACHMENT 1

Site Location Map



Oronogo/Duenweg Mining Belt Site
Jasper County, Missouri

Date: July 1998

JASPER COUNTY SITE MAP

Figure: 1

ATTACHMENT 2

List of Documents Reviewed

Record of Decision, Ground Water, Operable Unit 4, Jasper County Superfund Site, Jasper County, Missouri, July 1998

Record of Decision, Residential Yard and Mine Waste Yard Soils, Operable Units 2 and 3, Oronogo-Duenweg Mining Belt Site, Jasper County, Missouri, June 1996

Childhood Follow-up Lead Exposure Study: Report to the Agency for Toxic Substances and Disease Registry, January 23, 2002, Draft Final Report